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REVIEW OF ALTERNATE BALLAST WATER EXCHANGE ZONES FOR VESSEL TRAFFIC TO NEWFOUNDLAND AND LABRADOR AND THE CANADIAN ARCTIC

Figure 1: Map of the Fisheries and Oceans Canada (DFO) regions including the general areas where Alternate Ballast Water Exchange Zones are currently being assessed (circled).

Context:

Ballast water carried and exchanged by ships provides a vector for the transfer of biota from one region to another. Under the Canada Shipping Act, *all transoceanic ships entering Canadian waters are required to exchange ballast water outside of the Canadian Exclusive Economic Zone (EEZ). This strategy is meant to reduce the risk of successful transfer of non-indigenous biota. If offshore exchange is not possible because it would compomise the stability or safety of the ship or its personnel, current regulations allow for exchange of ballast in a designated Alternate Ballast Water Exchange Zone (ABWEZ).*

Transport Canada requested scientific advice from Fisheries and Oceans Canada (DFO) on two proposed and one current site for ABWEZ for commercial transoceanic vessel traffic enroute to Newfoundland and Labrador, Hudson Bay and the western Canadian Arctic via the Beaufort Sea (Fig. 1).

In the case of Hudson Strait, where there is already an ABWEZ, Transport Canada asked DFO to review the existing zone and determine if any modifications should be recommended based on existing scientific knowledge.

Transport Canada also asked DFO to consider the possibility of recommending other ABWEZs for commercial vessels to Newfoundland, as well as the Beaufort Sea.

June 2010

Canada

SUMMARY

Hudson Strait

- No information was presented to assess other areas for ABWEZ outside of Hudson Strait and the Hudson Bay complex.
- Based on the current knowledge of the oceanography and ecology of Hudson Strait and the Hudson Bay complex in general, it is recommended that the existing ABWEZ in Hudson Strait be modified to extend further east from the existing zone to increase the likelihood of ballast being carried out to the Labrador Current, and made narrower to minimize the risk of shoreline contamination by non-indigenous species.
- The Hudson Strait ABWEZ should be reassessed periodically as more information becomes available on the ecosystem, and vessel traffic conditions change.
- Consideration should be given to include the Labrador Sea in any reassessment and to consider if ballast water exchange outside of the current ABWEZ in Hudson Strait would reduce the risk of successful transfer of non-indigenous biota.

Beaufort Sea

- The science review of relevant information on the current level of knowledge of the ecology, oceanography, and shipping patterns in the Beaufort Sea region was conducted and concluded that no ABWEZ could be identified within the Beaufort Sea.
- Should the environment, ice conditions or the need to designate a zone change significantly over the coming years, the potential of an ABWEZ in the Beaufort Sea could be reassessed.

Newfoundland and Labrador

- Based on the review of the current navigation conditions and the ecological sensitivities of the areas for potential ABWEZs on the east coast of Newfoundland and Labrador, no ABWEZs are recommended at this time.
- For the northeastern coast of Newfoundland and Labrador region an ABWEZ could be located at least 50 nautical miles offshore and in water depths greater than 500 m; but further research is needed before formal recommendations could be made.
- For the southern and eastern coasts of Newfoundland and Labrador region, no ABWEZs are being recommended.

INTRODUCTION

Current Ballast Water Control and Management regulations under the Canada Shipping Act (P.C. 2006-495 June 8, 2006) require ships traveling outside Canada's EEZ, whether coastal or transoceanic, to exchange their ballast water and to flush tanks that contain residual amounts of ballast water with saltwater before entering Canadian waters. Vessels containing ballast from

foreign waters are normally required to conduct a mid-ocean exchange of their ballast water outside the EEZ, which extends up to 370 km (200 nautical miles) offshore. When mid-ocean exchange is not recommended due to safety concerns, such as weather conditions and subsequent threats to ship stability, vessels from outside the EEZ bound for ports in Canada are allowed to exchange ballast in an alternate ballast water exchange zone (ABWEZ) upon the Minister for Transport Canada's approval.

Fisheries and Oceans Canada (DFO) held a National science advisory process on January 13-14, 2009, in Winnipeg, Canada, to review three working papers on potential ABWEZs. The working papers considered ABWEZs in Hudson Strait in the eastern Arctic, the Beaufort Sea in the western Arctic and off the Newfoundland and Labrador coast. The peer review assessed the information presented, the limitations of and the conclusions drawn from the three scientific review papers. The purpose of the meeting was to provide DFO science advice on alternate ballast water exchange zones in the three areas, including advice on possible locations and potential risks associated with the alternate ballast water exchange zones.

ASSESSMENT

Hudson Strait

There are currently two ABWEZs identified in the Canada Shipping Act Ballast Water Control and Management Regulations in the Canadian Arctic. These are to accommodate vessels westbound into the Canadian Eastern Arctic north of 60°N latitude that are allowed to exchange ballast in an ABWEZ. The two ABWEZs are in Lancaster Sound and Hudson Strait although only the Hudson Strait ABWEZ was considered in this review. Under the regulations, ballast water can be exchanged within Hudson Strait east of 70°W longitude where the water is at least 300 m deep. Neither ABWEZ received scientific peer review before entering the regulations.

Little is known of the oceanography and ecology of Hudson Strait and the Hudson Bay complex in general. Even less is known of potentially invasive biota being carried there in ballast water. Depth, temperature, salinity, distance from shore, currents, tidal range, and ice cover were the physical parameters used to consider where best to locate an alternative ballast water exchange zone within the Hudson Bay Complex and Hudson Strait (Stewart and Howland 2009) to make it harder for invasive species from warmer coastal waters to become established.

The deep, cold, relatively saline and seasonally ice-covered waters of the existing ABWEZ are removed (~20-50 km) from shore and subject to strong eastward currents (Stewart and Howland 2009). They remain the preferred exchange zone within Hudson Strait. These same characteristics also mean that the biota taken up during the exchange may be less likely to establish in the shallower, warmer, less saline coastal waters near Churchill.

It is important to reduce the risk of introduction into Hudson Bay so any extension further west is not recommended. Additionally, as the current running along the north shore of Hudson Strait moves westward into Hudson Bay, this area should be avoided for ballast water exchange. Near shore communities in Ungava Bay and on the north shore of the Strait are to be avoided to limit the risk of successful introduction of non-indigenous species so the current ABWEZ should be made narrower. It is important to exchange in the current flowing out of Hudson Strait to the Labrador Current so it is recommended that the existing zone be extended further east.

Sources of Uncertainty

The assessment did not consider areas further east, outside of Hudson Strait.

Discussion of water currents in the Hudson Strait area were based on broad generalizations rather than oceanographic modeling (dispersion results). Since currents were an important consideration, the lack of detailed analysis adds uncertainty to the assessment.

Beaufort Sea

A need for an ABWEZ in the western Arctic has been identified, and was considered a priority given the renewed interest in hydrocarbon development in this region. Fissel and Cross (in prep.) summarized relevant information on the ecology, oceanography, and shipping patterns in the Beaufort Sea region to assess the ecological risks of non-indigenous species introductions associated with ballast water exchange.

Commercial navigation going North in the Pacific Ocean to the Beaufort Sea must go through and are required by law to perform Ballast water exchange prior to going through United States (US) Waters.

Newfoundland and Labrador Region

The scientific advice on alternate ballast exchange zones for the Newfoundland and Labrador region is based on oceanographic modeling (dispersion results), ecologically and biologically significant areas (EBSAs) and the sustainability of fisheries and aquaculture.

McKenzie *et al.* (in prep.) explored the possibility of identifying an ABWEZ in the Northeastern Newfoundland Shelf region. Exchange of Ballast water in this region should take place offshore of the 1000-m isobath where possible. If exchange is not possible in this region, exchange could take place inshore of the 1000-m isobath; but no exchange should happen inshore of the 200-m isobath. There is also a possibility that the ballast water exchange in this region may affect the Strait of Belle Isle and the northeastern Newfoundland coast where high concentrations of aquaculture operations are located. Further research is therefore required before any specific region could be officially delineated and recommended.

CONCLUSIONS AND ADVICE

Hudson Strait

Based on current information on the oceanography and ecology of Hudson Strait and the Hudson Bay complex in general, it is recommended that the existing ABWEZ in Hudson Strait be modified to extend further east from the existing zone, and made narrower to minimize the risk of shoreline contamination by non-indigenous species. The ABWEZ in Hudson Strait could remain in force but its location should be specified more precisely to ensure that exchange takes place over water deeper than 300 m and as far as possible from the coasts. The zone bounded in the east by 63°W; to the north by a line from 61°05'N, 63°00'W to 61°05'N, 67°00'W to 61°30'N, 69°00'W; in the west by 69°W; and to the south by a line from 61°30'N, 69°00'W to 60°55'N, 67°00'W to 61°05'N, 63°00'W is recommended (Fig. 2).

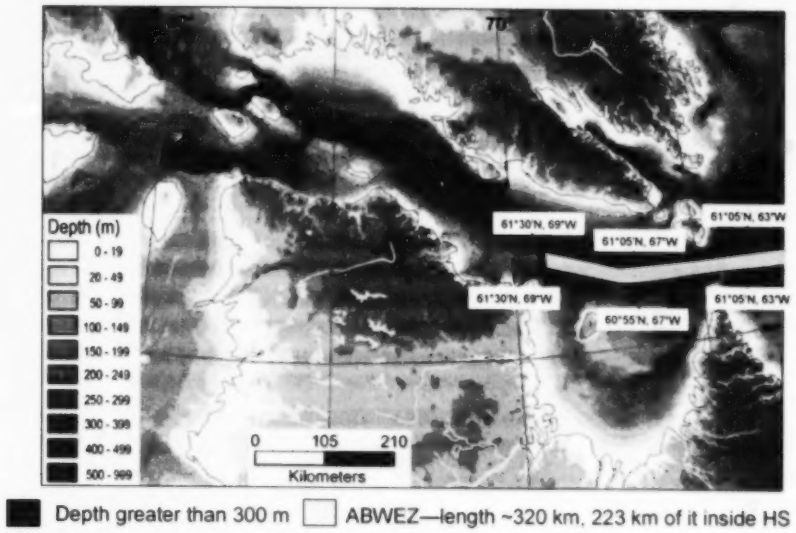

Figure 2. Recommended changes to the current ABWEZ in Hudson Strait.

The ABWEZ should be reassessed periodically to ensure that it remains the best choice for vessels entering Hudson Strait. Areas farther east, in the Labrador Sea should be included in future reassessment and data/modelling of currents should be part of the assessment.

Beaufort Sea

To date, there has been little, if any, ballast water exchange in the Beaufort Sea. A need to consider an ABWEZ in the western Arctic was identified considering the interest in natural resources exploitation in this region, which may force larger vessels to enter the Beaufort Sea in the future. It was concluded that under the current level of scientific knowledge and the current climate and ice conditions, no zones could be recommended as a potential ABWEZ in the Beaufort Sea. Should the environment, ice conditions or the need to designate a zone change significantly over the coming years, the potential of an ABWEZ in the Beaufort Sea could be reassessed.

Newfoundland and Labrador

It was concluded that currently no zones could be recommended as a potential ABWEZ for Newfoundland and Labrador. It is possible that an ABWEZ could be located on the Northeastern coast of Newfoundland and Labrador but further research would be required in order to specifically delineate the ABWEZ.

OTHER CONSIDERATIONS

Several concerns were raised throughout the peer review meeting with respect to risk of non-indigenous species introduction related to port of origin of transoceanic and likely domestic

vessels. Depending on ports of origin, some regions across the globe do represent higher risks of non-indigenous species introduction. Therefore, based on these concerns, it was recommended that additional research should be made and include a detailed "port of origin risk assessment" as well as modified testing to determine the abundance and rate of introduction of non-indigenous species through ballast water. Research emphasis should be placed on several Canadian ecologically sensitive areas with high vessel traffic, milder climate and multi-user nature areas.

Currently ships that operate exclusively in waters under Canadian jurisdiction are exempt from ballast water exchange regulations. There is concern that their ballast water poses an unknown but potentially significant pathway for the transfer of non-indigenous species within Canadian waters. An assessment of the risk posed by domestic vessels should be undertaken. Additionally if ballast exchange is recommended for domestic vessels, whether it is appropriate to exchange ballast in the current ABWEZs meant for transoceanic vessels.

Considering that the ABWEZ in Hudson Strait was not established following a scientific review of all relevant information, it is recommended that no additional ABWEZs should be considered without a thorough scientific investigation.

SOURCES OF INFORMATION

Stewart, D.B. and K.L. Howland. 2009. An Ecological and Oceanographical Assessment of the Alternate Ballast Water Exchange Zone in the Hudson Strait Region. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/008. vii + 89 p.

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